

A. 3 (mold)  
packaging for food, iii) a molded body or film for hygienic or medicinal application, and iv)  
a hot melt-adhesive or adhesive material for textile application.

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### REMARKS

Reconsideration of the subject application is respectfully requested in view of the preceding amendments and for the following reasons.

In the outstanding Office Action, the Patent Office rejects claims 1-11 and 15-20 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent 5,455,312 to Heidingsfeld et al. (Heidingsfeld) in view of *Chemistry and Technology of Isocyanates*, 1996, page 315, by Ulrich (Ulrich), U.S. Patent 6,350,530 to Morikawa (Morikawa) and *Polyurethanes*, 1990, pages 181-182, by Woods (Woods). Applicants respectfully traverse this rejection and assert that the primary reference, Heidingsfeld, whether viewed alone or in combination with any/all of the afore-cited secondary references, neither discloses nor suggests Applicants' presently claimed invention for at least the following reasons.

In order to reject a claim for obviousness under 35 U.S.C. § 103, the prior art must teach or suggest each and every element of the claim and must also suggest combining the elements in the manner contemplated by the claim. See *Northern Telecom, Inc. v. Datapoint Corp.*, 908 F.2d 931, 934 (Fed. Cir.), *cert. denied*, 111 S.Ct. 296 (1990); *In re Bond*, 910 F.2d 831, 834 (Fed. Cir. 1990). However, none of the references the Patent Office cites, alone or in combination, teaches or suggests each of the elements recited in Applicants' independent claim 1 or any of the remaining rejected claims, which all depend upon this claim.

Specifically, independent claim 1 is directed to a molded polyurethane body that is dimensionally stable up to at least 150°C. This polyurethane body is obtained by, in part, reacting a) at least one aliphatic polyol having a molecular weight of 450 to 6000 g/mol and an hydroxyl value of 10 to 235; b) with an aliphatic diisocyanate, a cycloaliphatic diisocyanate or both, in an equivalent ratio of diisocyanate to polyol of 1.2 : 1.0 to 16.0 : 1.0; c) with a diol as a chain lengthening agent having a molecular weight of 60 to 450 g/mol; and d) with an at least bifunctional reaction component. Advantageously, the bifunctional reaction component comprises an isocyanate, which is suitable for subsequent cross-linking, and which reacts with the terminal hydroxyl groups of the polyurethane chain as well as with the acidic hydrogen atoms of the urethane groups and leads to branched-chain reactions. Moreover, the thermoplastic polyurethane is formed by conversion from the components a) through c) in a first step being homogeneously mixed in a second step, using a tumbling mixer, with 0.2 to 25 parts by weight of component d) with respect to 100 parts by weight of the thermoplastic polyurethane. The molded body is formed and cross-linked at temperatures from 80 to 240°C.

As disclosed in Applicants' specification at page 2, it has been discovered that aliphatic, linear, long-chain, thermoplastic polyurethanes are significantly improved by adding a latently reactive cross-linking component that under processing conditions at increased temperatures results in a higher molecular, branched polyurethane. In particular, the molded polyurethane bodies according to the present invention have higher temperature stability, hot-light stability, as well as dimensional heat stability.

In contrast, Heidingsfeld does not disclose nor suggest Applicants' presently claimed molded polyurethane body, as set forth in independent claim 1. To the contrary, Heidingsfeld is



merely directed to improving extruder processes for producing thermoplastic polyurethanes.

Nowhere does Heidingsfeld disclose or suggest Applicants' presently claimed combination of components for a molded polyurethane body that is dimensionally stable up to at least 150°C.

Moreover, the Patent Office even recognizes at page 1 of the Action that Heidingsfeld does not teach Applicants' claimed molded polyurethane body.

Applicants respectfully assert that the addition of Ulrich does not cure the shortcomings of Heidingsfeld. That is, Ulrich is merely a one page reference about diisocyanates. Ulrich discloses that polyurethanes based on aromatic isocyanates undergo oxidative discoloration on exposure to light and moisture. Similarly, Ulrich discloses that polyurethanes based on aliphatic isocyanates must be formulated with antioxidants and UV stabilizers to prevent yellowing upon long-range exposure to the elements. Aliphatic diisocyanates are considerably more expensive than aromatic diisocyanates, according to Ulrich.

Applicants respectfully assert that the general disclosures of Ulrich provide no teaching or suggestion of the constituents of presently claimed molded polyurethane body, whether Ulrich is viewed alone or in combination with Heidingsfeld. Applicants respectfully point out that one cannot base a determination of obviousness on what the skilled person might try or find obvious to try. Rather, the proper test requires a determination of what the prior art would have led the skilled person to do.

Nor does the addition of Morikawa and/or Woods disclose or suggest the presently claimed invention. In particular, Morikawa is merely directed to card bases for credit cards, bank cards, prepaid cards, commuter passes, ID cards and patient registration cards. Col. 1, lines 5-10.



Applicants respectfully assert that one skilled in the art seeking to develop the presently claimed molded polyurethane body that is dimensionally stable up to at least 150°C, and method for producing such a body, would not even be motivated to look to this reference for guidance.

Regarding claims 17-20, the Patent Office then cites Woods as disclosing that thermoplastic polyurethanes can be used for a “large variety of applications.” Applicants respectfully assert that Woods does not disclose nor suggest the structures set forth in claims 17-20 comprising the components and features of Applicants’ molded polyurethane body of independent 1, whether Woods is viewed alone or in combination with any of the afore-cited references. Moreover, the Patent Office has pointed to no suggestion of such claimed structures.

Applicants respectfully assert that a teaching, suggestion or motivation that would lead one skilled in the art to combine and then modify the afore-cited references in an attempt to arrive at the presently claimed invention has not been provided. It is well established that “there must be some reason for the combination other than the hindsight gleaned from the invention itself.” *Uniroyal v. Rudkin-Wiley*, 5 U.S.P.Q. 2d 1434, 1438 (Fed. Cir. 1988). There must be some prior art teaching that would have provided that necessary incentive or motivation for modifying the primary reference in the manner suggested by the Examiner. As stated by the Federal Circuit in *In re Fritch*:

The mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggest the desirability of the modification.

23 U.S.P.Q. 2d. However, none of the cited references, whether viewed alone or in combination, teaches or suggests each of the elements recited in Applicants’ present claims for at least the foregoing reasons.



Moreover, Examples 1 and 2 at pages 4-6 of the specification in comparison to the Comparative Example demonstrate the superior and unexpected results of Applicants' polyurethane body. For instance, as described at page 7 of the specification, the comparative material exhibited a lower melting point and measurable melt indices for the entire measured temperature range, as well as changes on the surface and in the grain structure in response to heat aging and hot-light aging starting at 120°C.

Additionally, new claims 21-24 have been added to further claim the subject matter of the present invention. It is respectfully submitted that these claims also are allowable for reasons set forth above.

In view of the amendments and remarks set forth herein, the application is believed to be in condition for immediate allowance and such favorable action is earnestly solicited.

The Office is hereby authorized to charge any required fees or credit any overpayments to Deposit Account No. 11-0600.

Respectfully submitted,



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**VERSION WITH MARKINGS TO SHOW CHANGES MADE**

IN THE CLAIMS:

Please amend claims 1 and 15, cancel claim 16 and add new claims 21-24 as follows:

1. (Amended) A molded polyurethane body obtained by reacting
- at least one aliphatic polyol having a molecular weight of 450 to 6000 g/mol and an hydroxyl value of 10 to 235;
  - with an aliphatic diisocyanate, a cycloaliphatic diisocyanate or both, in an equivalent ratio of diisocyanate to polyol of 1.2 : 1.0 to 16.0 : 1.0;
  - with a diol as a chain lengthening agent having a molecular weight of 60 to 450 g/mol, the NCO index formed from the quotient, which is multiplied by 100, of the equivalent ratio of isocyanate groups to the sum of the hydroxyl groups of polyol and chain lengthening agents lying within a range of 90 to 105; and
  - with an at least bifunctional reaction component comprising an isocyanate, which is suitable for subsequent cross-linking, and which reacts with the terminal hydroxyl groups of the polyurethane chain as well as with the acidic hydrogen atoms of the urethane groups and leads to branched-chain reactions, the thermoplastic polyurethane formed by conversion from the components a) through c) in a first step being homogeneously mixed in a second step, using a tumbling mixer, with 0.2 to 25 parts by weight of component d) with respect to 100 parts by weight of the thermoplastic polyurethane, formed into a molded body, and subsequently cross-linked at temperatures from 80 to 240°C, wherein the polyurethane body is dimensionally stable up to at least 150°C.
- marked up*
- a*

15. (Amended) A method for producing a molded polyurethane body according to Claim 1, comprising the steps of producing a thermoplastic polyurethane molding material from components a) through c) and well homogenizing the polyurethane molding material in a powdered or granular form with component d), and forming the homogenized material into a molded body and subsequently cross-linking at temperatures of 80 to 240°C, wherein component d) is applied in a liquid, paste-like, or solid form at room temperature in a tumbling mixer by tumbling on the thermoplastic, polyurethane molding material obtained from the components a) through c) in the first step.

Please cancel claim 16.

21. (New) A molded polyurethane body obtained by reacting

- a) a polycaprolactone;
- b) with a 1,6 hexamethylene diisocyanate;
- c) with a 1,6 hexane diol; and
- d) with a triisocyanate suitable for cross-linking and having a molecular weight of 478 g/mol and an isocyanate content of 16% by weight, the thermoplastic polyurethane formed by conversion from the components a) through c) in a first step being homogeneously mixed in a second step, using a tumbling mixer, with 8 parts by weight of component d) with respect to 100 parts by weight of the thermoplastic polyurethane, formed into a molded body, and subsequently cross-linked at temperatures from 80 to 240°C, wherein the polyurethane body is dimensionally stable up to at least 150°C.

*marked up*

22. (New) A molded polyurethane body obtained by reacting

*a*

- a) a polycaprolactone;
- b) with a 1,6 hexamethylene diisocyanate;
- c) with a 1,6 hexane diol; and
- d) with a dimeric isocyanate based on isophorone diisocyanate having a uretdione structure and an isocyanate content of 16% by weight, the thermoplastic polyurethane formed by conversion from the components a) through c) in a first step being homogenously mixed in a second step, using a tumbling mixer, with 10 parts by weight of component d) with respect to 100 parts by weight of the thermoplastic polyurethane, formed into a molded body, and subsequently cross-linked at temperatures from 80 to 240°C, wherein the polyurethane body is dimensionally stable up to at least 150°C.

23. (New) The molded polyurethane body of claim 21 wherein the body is selected from the group consisting of: i) a surface material for application in the interior of a motor vehicle, ii) a packaging for food, iii) a molded body or film for hygienic or medicinal application, and iv) a hot melt-adhesive or adhesive material for textile application.

24. (New) The molded polyurethane body of claim 22 wherein the body is selected from the group consisting of: i) a surface material for application in the interior of a motor vehicle, ii) a packaging for food, iii) a molded body or film for hygienic or medicinal application, and iv) a hot melt-adhesive or adhesive material for textile application.

*marked up*

*a*